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What explains wage differences between male and female Brazilian physicians? A cross-sectional nationwide study

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ABSTRACT

Objective In many countries an increase in the number of women in medicine is accompanied by gender inequality in various aspects of professional practice. Women in medical workforce usually earn less than their male counterparts. The aim of this study was to describe the gender wage difference and analyse the associated factors in relation to Brazil's physicians.

Participants 2400 physicians.

Setting Nationwide, cross-sectional study conducted in 2014.

Methods Data were collected via a telephone enquiry. Sociodemographic and work characteristics were considered factors, and monthly wages (only the monthly earnings based on a medical profession) were considered as the primary outcome. A hierarchical multiple regression model was used to study the factors related to wage differences between male and female physicians. The adjustment of different models was verified by indicators of residual deviance and the Akaike information criterion. Analysis of variance was used to verify the equality hypothesis subsequently among the different models.

Results The probability of men receiving the highest monthly wage range is higher than women for all factors. Almost 80% of women are concentrated in the three lowest wage categories, while 51% of men are in the three highest categories. Among physicians working between 20 and 40 hours a week, only 2.7% of women reported receiving >US$10 762 per month, compared with 13% of men. After adjustment for work characteristics in the hierarchical multiple regression model, the gender variable estimations (ß) remained, with no significant modifications. The final effect of this full model suggests that the probability of men receiving the highest salary level (≥US$10 762) is 17.1%, and for women it is 4.1%. Results indicate that a significant gender wage difference exists in Brazil.

Conclusion The inequality between sexes persisted even after adjusting for working factors such as weekly workload, number of weekly on-call shifts, physician office work, length of practice and specialisation.

Strengths and limitations of this study

- ► This is a probabilistic representation of Brazilian physicians (2400 physicians).
- ► The multinomial model used in the study gave a differential advantage to support the discussion on gender wage inequality.
- ► It is impossible to establish causality or to argue about the temporal effect of physicians' income difference due to the study's cross-sectional design.
- ► The study was based on self-reported information about income, although collecting income data through wage categories might have helped to increase the adhesion response for this particular variable.

INTRODUCTION

Despite women's significant progress in educational and professional achievements in recent years,[1] inequality in opportunities, treatment and outcomes between women and men persist in global labour markets.[2] Wage disparity between men and women has been conspicuously reported worldwide, and although gender-related income differences have generally narrowed in several countries during the last decades[3–7] wage gap within numerous professions is far from being eliminated.[2 7] Gathering reliable information on the key determinants of such scenario, especially through analyses considering the profile, profession and comparable job standards,[7 8] is crucial to the definition and implementation of sustainable policies to promote gender wage equality.

Although it may be highly variable across different countries,[7] the gender wage disparity is currently estimated at 23% worldwide, meaning that women in general earn 77% of men's income.[2] Such disparities are less prominent in traditional professions such as medicine, engineering and law, but even so a significant difference is found in income values between men and women among medical professionals.[8–12] Most studies[13–18] tackling wage disparities between male and female physicians have considered only a limited number of variables influencing such differences. Variables such as specialty, working hours and length of time in practice have been pointed out to justify lower wages for women; however, when variables are properly controlled for these characteristics, the wage gap usually persists.[13 19] While gender gap disparity has been extensively studied in recent years,[13 18–22] possible interactions between variables should be further explored in order to identify cause-and-effect scenarios.

In Brazil, the medical workforce is still mostly represented by male physicians (54%), with marked over-representation of men in certain medical specialties, such as general surgery, cardiology and orthopaedics/traumatology.[23] The proportion of female physicians, however, has rapidly increased during the past decades,[24] and women currently represent the majority of physicians among medical students and young professionals,[23] thus resonating the feminisation phenomenon widely reported in different locations.[19 25–32]

Despite the growing participation of women in the Brazilian medical workforce, the general gap in salary between male and female physicians is estimated at 24%.[7 33] The medical profession in Brazil is marked by the coexistence of multiple job affiliations and possibilities of insertion in the health system.[34] Salary is determined by multiple variables, such as professional promotions across the medical career and holding simultaneous job positions in public and private services, where they are blindly paid for the care they provide. Therefore, the drivers behind such disparities are still unclear, and the sociodemographic, professional and behavioural characteristics that might be determinant to explain wage gap differences among Brazilian physicians are yet to be determined.

In this context, we describe here the first representative cross-sectional study of gender wage disparity in the Brazilian medical workforce. By using a hierarchical multiple regression model approach, we explored work-related and sociodemographic characteristics that might explain income differences between male and female physicians. We describe the influence of 12 distinct independent variables on salary distribution to test the hypothesis that physicians' gender is a confounding variable in relation to wage discrepancy, and that the influence of gender would disappear when adjusting for specific characteristics that relate to medical workload and other modifiable wage-related variables.

METHODS

Sampling design

Brazil is a South American Federative Republic composed of 26 states and 1 Federal District, with a population of approximately 206 081 432 inhabitants. The country has a Human Development Index (a comprehensive index that incorporates population life expectancy, education and income) of 0.755 and a gross domestic product of US$11 067 per capita.[35] In 2014 there were 399 692 Brazilian physicians with an active medical record in the National Council of Medicine (CFM, Conselho Federal de Medicina) database.[36]

A nationwide, cross-sectional study that included 2400 physicians was conducted in 2014. This sample size was calculated with a 95% confidence level, 5% margin of error and statistical power of 80%. A proportional stratified sample was drawn according to the population size from the five Brazilian regions—Northern, Northeastern, Southeastern, Southern, Central-western—each one being considered as statistical stratum. Within each stratum, physicians' distribution for gender, age, state and location of address (city capital and countryside) was preserved in sampling groups to reflect the population's distribution. The individuals selected in the original sample could be replaced by other individuals only if not accessible or if those contacted refused to participate. Reposition individuals were drawn from the same sampling group, meaning that every physician who refused to participate was replaced by an individual with the same characteristics, to minimise participation bias. The list of active physicians provided by the CFM enabled the random performance of all procedures.

Data collection

Data were collected via a telephone enquiry approach. Fourteen professionals, including one field coordinator, eleven experienced interviewers and two professionals responsible for checking missing data, were involved in the data collection. The interviews consisted of a 30 min questionnaire, containing 30 questions ranging from multiple-choice, closed questions to interdependently concatenated and semiopened questions.

Three senior researchers from the medical demography field had previously evaluated the questionnaire and conducted a pilot experiment that included 30 interviews in order to estimate the reposition rate and to pinpoint possible questionnaire inaccuracies. The questionnaire's reproducibility was tested using a random sample after the field collection and repetition of the interview, resulting in 100% agreement. Based on the questionnaire results, dependent and independent variables were further defined.

Patient and public involvement

Patients and/or the public were not involved.

Variables

The independent variables used were divided into two groups: (1) sociodemographic characteristics, including gender, age, Brazilian region and location of address; and (2) characteristics of the medical work, including city of work, administrative nature of services, place of medical work, physician office work, on-call services, number of weekly on-call shifts (NOWOC, considering

12 or 24 hours), time in practice, total weekly workload, medical specialty and physicians' specialties.

Monthly wage was considered the dependent variable, and only income obtained exclusively through medical activities, including incentives and bonus pays, was considered. The questions regarding income values were formulated using income range categories in order to ensure that physicians would actually answer their monthly earnings. The categories were established as follows: (1) ≤US$3857, (2) US$3587–5381, (3) US$5381–7175, (4) US$7175–8969, (5) US$8969–10 762, (6) ≥US$10 762 and (7) did not answer. Income was also divided into three categories to compare gender income differences between and within different medical specialties (≤US$5381, >US$5381 and did not answer).

The purchasing power parity (PPP) for Brazil in 2013 was R$1.65 to US$1.00,[37] meaning that the cost of living was 25% cheaper in Brazil when compared with the USA. However, the following analysis has used exchange rate values instead to minimise the effect of the high PPP variability within Brazilian regions and to facilitate international comparison. The values in Brazilian currency (R$) were converted into US dollars based on an exchange rate of R$2.0742 for US$1 (average exchange rate for the year 2013). Physicians who did not provide information on monthly wages were not considered in the analysis.

Hierarchical framework modelling

A hierarchical multiple regression model was used to investigate the factors related to wage differences between male and female physicians. This type of analysis is generally used to explain the relationship between variables in models with a set of empirical propositions that already indicate the relationship strength and direction between predictors and outcomes. Building a conceptual framework requires knowledge of the biological or social and temporal determinations that affect the outcomes,[38] and the order of predictor entry in the regression equation was defined based on a pre-established conceptual framework.[39] For modelling in this paper, the position of a specific set of variables regarding the outcome was based on previous bivariate analysis (online supplementary table S1), with significant association (from stronger to weaker): (1) gender was considered the proximal term; (2) medial terms included work-related variables such as weekly workload, NOWOC shifts and physician working in office; and (3) length of time in practice and medical specialty type were considered distal terms (figure 1).

Statistical analysis

The selected variables were initially studied using a frequency analysis that included 95% CI[40] estimated from 1000 bootstrap samples.[41] All analysed crossings were stratified for gender. Unadjusted prevalence ratio (PR; female physician:male physician) was used to evaluate the influence of individual factors on monthly wage.

To study the adjusted influences of the independent variables in relation to monthly wage, multiple model

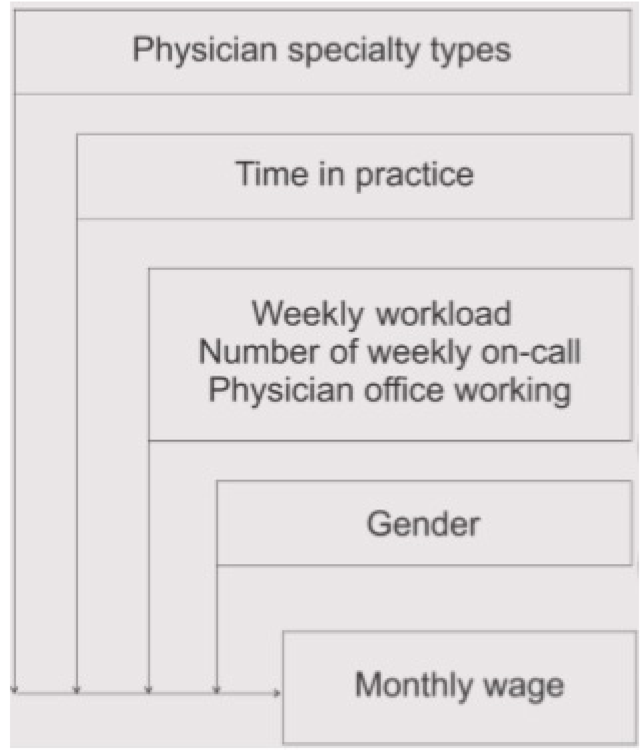

Figure 1 Theoretical framework used to analyse factors associated with wage differences between male and female Brazilian physicians.

analyses using multinomial distribution were adjusted.[42] Two analytical pathways were carried out: (1) we used a sequential entry of selected variables (from empty model to full model) to determine the main effect; and (2) we based the analysis on a full model plus specific interactions to study interaction effects between gender and the work variables. The adjustment of different models was verified by indicators of residual deviance and the Akaike information criterion. Analysis of variance was used to verify the equality hypothesis among the different models.[43 44]

The database was exported to the software Statistical Package for the Social Sciences (SPSS) V.22 for Windows and R-GUI V.3.0.2 (http://www.r-project.org/) for statistical treatments. All significance levels were set at p<0.05.

RESULTS

The profile of 2400 male and female Brazilian physicians is shown in table 1.

The more heterogeneous sociodemographic characteristics between genders were age >60 years (male 26.3% [95% CI 23.9% to 28.7%] vs female 8.5% [95% CI 7.0% to 10.3%]) and physician with an address in urban centres (male 52.6% [95% CI 50.3% to 55.3%] vs female 61.3% [95% CI 58.5% to 64.5%]).

The more heterogeneous work-related characteristics included working in public services (female 26.7% [95% CI 24.1% to 29.5%] vs male 17.8% [95% CI 15.8 to 19.9]), private hospitals (male 42.4% [95% CI 39.8%

Table 1 Proportions (95% CI) of the sociodemographic and work-related characteristics of 2400 Brazilian physicians stratified by gender

Sociodemographic characteristics	Gender			
	Male	% (95% CI)	Female	% (95% CI)
Age (years)				
<35	368	26.7 (24.4 to 29.0)	376	36.8 (33.9 to 39.8)
35–60	649	47.1 (44.5 to 49.6)	558	54.7 (51.7 to 57.5)
>60	362	26.3 (23.9 to 28.7)	87	8.5 (7.0 to 10.3)
Total	1379	–	1021	–
Brazilian region				
Northern	64	4.6 (3.6 to 5.8)	40	3.9 (2.8 to 5.1)
Northeastern	234	17.0 (14.9 to 18.9)	180	17.6 (15.2 to 20.0)
Southeastern	745	54.0 (51.4 to 56.7)	600	58.8 (55.6 to 61.8)
Southern	214	15.5 (13.7 to 17.5)	140	13.7 (11.7 to 15.9)
Central-western	122	8.8 (7.5 to 10.4)	61	6.0 (4.6 to 7.4)
Total	1379	–	1021	–
Location of address city				
Capital	725	52.6 (50.3 to 55.3)	626	61.3 (58.5 to 64.5)
Countryside	654	47.4 (44.7 to 49.7)	395	38.7 (35.5 to 41.5)
Total	1379	–	1021	–
Physician work characteristics				
Dedication to medical work				
Integral	1171	84.9 (83.0 to 86.8)	839	82.2 (79.9 to 84.6)
Partial	208	15.1 (13.2 to 17.0)	182	17.8 (15.4 to 20.1)
Total	1379	–	1021	–
City of work				
Same city where they live	868	62.9 (60.4 to 65.6)	670	65.6 (62.6 to 68.5)
Another city	105	7.6 (6.2 to 9.1)	64	6.3 (4.8 to 7.8)
Both	406	29.4 (27.1 to 31.9)	287	28.1 (25.5 to 30.8)
Total	1379	–	1021	–
Administration				
Public	245	17.8 (15.8 to 19.9)	273	26.7 (24.1 to 29.5)
Private	414	30.0 (27.6 to 32.5)	233	22.8 (20.3 to 25.5)
Both	720	52.2 (49.6 to 54.8)	515	50.4 (47.4 to 53.5)
Total	1379	–	1021	–
Place of work				
Private institutions				
Hospital	585	42.4 (39.8 to 45.0)	329	32.2 (29.4 to 35.1)
Clinic/Ambulatory	457	33.1 (30.7 to 35.7)	289	28.3 (25.6 to 31.1)
Physician's office	588	42.6 (54.7 to 60.0)	375	36.7 (33.8 to 39.7)
University/College	77	5.6 (4.5 to 6.9)	50	4.9 (3.7 to 6.4)
Total*	–	–	–	–
Public institutions				
Hospital	708	51.3 (48.7 to 54.0)	528	51.7 (48.6 to 54.8)
Family health strategy	295	21.3 (19.2 to 23.5)	268	26.6 (23.6 to 29.0)
Other secondary services†	62	4.5 (3.5 to 5.7)	53	5.2 (4.0 to 6.7)
University/College	56	4.1 (3.1 to 5.2)	43	4.2 (3.1 to 5.6)

Continued

Table 1 Continued

Sociodemographic characteristics	Gender			
	Male	% (95% CI)	Female	% (95% CI)
Total*	–	–	–	–
On-call working				
Yes	624	45.3 (42.6 to 48.1)	554	45.7 (42.7 to 49.0)
No	755	54.7 (51.9 to 57.4)	467	54. 3 (51.0 to 57.3)
Total	1379	–	1021	–
Time in practice (years)‡				
<10	350	25.8 (23.5 to 28.1)	348	34.5 (31.6 to 37.6)
10–30	505	37.2 (34.5 to 39.8)	457	45.3 (42.0 to 48.3)
>30	503	37.0 (34.5 to 39.6)	204	20.2 (17.9 to 22.8)
Total	1358	–	1009	–
Weekly workload (hours)				
<20	84	6.1 (4.9 to 7.4)	40	3.9 (2.7 to 5.1)
20–40	239	17.3 (15.3 to 19.5)	226	22.1 (19.7 to 24.9)
40–60	552	40.0 (37.3 to 42.6)	482	47.2 (44.1 to 50.3)
>60	504	36.5 (33.9 to 39.0)	273	26.7 (24.0 to 29.7)
Total	1379	–	1021	–
Medical specialty§				
Yes	934	67.8 (65.4 to 70.4)	696	68.3 (65.2 to 71.1)
No¶	443	32.2 (29.6 to 34.6)	323	31.7 (28.9 to 34.8)
Total	1377	–	1019	–
Monthly wage				
≤US$3857	195	14.1 (12.4 to 16.0)	285	27.9 (25.1 to 30.9)
US$3857–5381	234	17.0 (15.1 to 18.9)	300	29.4 (26.4 to 32.2)
US$5381–7175	271	19.7 (17.6 to 22.0)	211	20.7 (18.3 to 23.1)
US$7175–8969	218	15.8 (13.9 to 17.7)	97	9.5 (7.7 to 11.3)
US$8969–10762	127	9.2 (7.8 to 10.7)	48	4.7 (3.3 to 6.0)
≥US$10762	277	20.1 (18.0 to 22.3)	45	4.4 (3.2 to 5.7)
Did not answer	57	4.1 (3.0 to 5.2)	35	3.4 (2.4 to 4.7)
Total	1379	–	1021	–

*The total number was suppressed because physicians can have multiple places of work simultaneously.
†Other services include specialisation ambulatory, ambulatory of medical assistance, emergency care units, psychosocial care centre and specialised services (AIDS reference centre, blood centre and haemotherapy, worker health centre, and so on).
‡Missing data were observed for 44 individuals.
§Missing data were observed for 3 individuals.
¶The term specialist refers to physicians who obtained the title of specialist by officially recognised specialty societies, through the Brazilian Medical Association, or by concluding medical residency programmes accredited by the National Medical Residency Commission. Physicians with no specialty in Brazil are often called generalists (which differ from those specialised in internal medicine) and often work in primary care services.

to 45.0%] vs female 32.2% [95% CI 29.4% to 35.1%]) and family health strategy [female 26.6% [95% CI 23.6% to 29.0%] vs male 21.3% [95% CI 19.2% to 23.5%]). The variables time in practice (male <10 years 25.8% [95% CI 39.8% to 45.0%] vs female 34.5% [95% CI 31.6% to 37.6%]), weekly workload (hours) (male >60 hours 36.5% [95% CI 33.9% to 39.0] vs female 26.7% [95%CI 24.0% to 29.7%]) and monthly wage (≥US$10762; male 20.1% [95% CI 18.0% to 22.0%] vs female 4.4% [95% CI 3.2% to 5.7%]) were also significantly heterogeneous.

Online supplementary table S2 shows the relationships between the proportions of monthly wage and work-related characteristics, specialties and gender. Women are over-represented in the first two lower monthly wage categories (≤US$3857 and US$3587–5381) for 10–30 years of time in practice (PR 3.53 [95% CI 2.31 to 5.40] and PR 2.39 [95% CI 1.86 to 3.07]), weekly workload >60 hours (PR 2.44 [95% CI 1.74 to 3.44] and PR 2.17 [95% CI 1.57 to 2.99]), ≤2 weekly on-call shifts (PR 1.93 [95% CI 1.46 to 2.55] and PR 2.2 [95% CI 1.66 to 2.92]) and >2 weekly on-call shifts (PR 2.26 [95% CI 1.4 to 3.65] and PR 1.97 [95% CI 1.23 to 3.15]), owning a physician office (PR 2.17 [95% CI 1.52 to 3.09] and PR 2.13 [95% CI 1.64 to 2.77]), working in a physician office (PR 2.10 [95% CI 1.42 to 3.11] and PR 2.04 [95% CI 1.46 to 2.86]), working in surgery-based specialties (PR 1.71 [95% CI 1.05 to 2.78] and PR 3.03 [95% CI 1.92 to 4.78]), and surgery plus internal medicine-based specialties (PR 2.48 [95% CI 1.58 to 3.90] and PR 1.68 [95% CI 1.18 to 2.38]). Men are more prevalent in ≥US$10 762 in all the categories of all work variables, except in the <20 hours of weekly workload category.

The difference in monthly wages was also explored according to the medical specialties stratified by gender (online supplementary table S3). The highest PRs of women in the first wage group (lowest wage) occurred in anaesthesiology (PR 2.30 [95% CI 1.38 to 2.30]), gynaecology and obstetrics (PR 2.27 [95% CI 1.47 to 2.27]), general surgery (PR 2.16 [95% CI 1.5 to 2.16]), other surgery specialties (PR 2.16 [95% CI 1.05 to 2.16]) and cardiology (PR 2.06 [95% CI 1.17 to 2.06]). Only in paediatrics, orthopaedics and trauma specialties the proportion of women in the lowest wage range was not significant.

By analysing the influences of the independent factors in relation to monthly wage, the model with the lowest residual deviance was the full model (table 2). This model explained a greater amount of variance when compared with all the other models. Residual deviance decreased from 8.00649 in the empty model to 7.16805 in the full model (online supplementary figure S1). After adjustment for the work characteristics in the multinomial multiple regression model, the gender variable remained at its estimated (ß) level, with no significant change. The final effect of this full model suggests that the probability of men receiving the highest salary level (≥US$10 762 per month) is 17.1% compared with 4.1% for women (online supplementary table S4 and figure S2).

The interactions between gender and work variables were studied in all simulations (online supplementary table S5). The probability of men being in the highest monthly wage class was higher than women for all factors. The most relevant interaction effects occurred in work in a physician office (19.1% vs 3.1%), <10 years of time in practice (8.6% vs 1.7%), 40–60 hours of weekly workload (20.0% vs 4.1%) and internal medicine-based specialties (17.2% vs 3.5%). The impact of these interactions can also be verified in online supplementary supplementary figure S3.

DISCUSSION

Our results show a high wage disparity between male and female Brazilian physicians. Almost 80% of women are concentrated in the three lowest wage categories (≤US$3857, US$3587–5381 and US$5381– 7175), while 51% of men are represented in the three highest wage categories (US$7175–8969, US$8969–10 762 and ≥US$10 762), with a male prevalence of more than 15% over female physicians in the highest category. This scenario represents a vertical segregation in which women are under-represented in higher paying positions.[45 46] This situation is similar to medical practice in the USA, where women earn 63% of men's income,[47] and in the UK, where men earn approximately 10% more than women.[48]

To explain the gender wage differences found, we included work-related characteristics such as weekly workload, time in practice and specialty as independent variables in a hierarchical modelling approach. However, even after these adjustments, the wage difference between men and women persisted, and the variability remained unexplained. These results are similar to those found in other studies[8 10 12 13 19 43–46] that also included work characteristics as adjustment factors.

Many authors have suggested that the weekly workload is a plausible explanation for wage disparity between genders, arguing that women earn less because they work fewer hours than men.[49 50] Our study shows that women were more prevalent than men in the categories of weekly workload of 20–40 and 40–60 hours (table 1), while male physicians were more prevalent among physicians working more than 60 hours per week. However, even after adjusting the wage for workload, female physicians were found to earn less than their male counterparts who work the same amount of time. The present study indicates that women also earn less when the wage differences are observed in each weekly workload range (table 2), as previously suggested.[51] Such disparities were also reported in a British study,[52] where female physicians' income per hour represented 89% of men's income. Similarly, in the USA,[53 54] women accounted for 83% of men's income even when working the same number of hours per week and weeks per year as men.

In Brazil, women are generally concentrated in specialties such as general practice, paediatrics, family medicine, gynaecology and obstetrics, which pay less if compared, for example, with surgical specialties, which are mostly occupied by men.[55] They also tend to be salaried employees and less likely to own medical offices.[15 56–58] Even in the face of this configuration, our results indicate that vertical segregation is present among specialists and non-specialists. Women are concentrated in the categories of lower wages, while men are predominant in the higher wage categories even when there is no difference in specialty between genders, suggesting that women might be occupying lower paying positions within specialties. These findings are similar to those reported by other scholars,[8 9] who found significant income gaps between men and women, even after adjusting for variables such as workload, level of productivity and years of experience. Unequal payments within specialties were also reported by Desai and colleagues,[8] who found that female physicians received statistically less reimbursement than male providers irrespective of the amount worked, level of productivity or years of experience.

Table 2 Hierarchical model used to study wage difference between Brazilian male and female physicians, including estimations (ß), SE and residual deviance among different proposed models

	Empty	Model 1		Model 2		Model 3		Model 4		Model 5		Full model	
	ß	ß	SE	ß	SE	ß	SE	ß	SE	ß	SE	ß	SE
Gender													
Women													
≤US$3857	–	1.000	–	1.000	–	1.000	–	1.000	–	1.000	–	1.000	–
US$3857–5381	–	−0.131	0.127	−0.207	0.132	−0.265	0.135	−0.270	0.135	−0.256	0.137	−0.277	0.137
US$5381–7175	–	−0.630	0.131	−0.736	0.137	−0.752	0.141	−0.764	0.142	−0.744	0.144	−0.770	0.144
US$7175–8969	–	−1.189	0.153	−1.253	0.161	−1.263	0.166	−1.274	0.166	−1.248	0.169	−1.235	0.170
US$8969–10 762	–	−1.352	0.193	−1.511	0.201	−1.470	0.205	−1.481	0.206	−1.446	0.209	−1.436	0.210
≥US$10 762	–	−2.197	0.186	−2.353	0.195	−2.268	0.199	−2.282	0.199	−2.242	0.202	−2.162	0.204
Weekly workload (hours)													
20–40													
≤US$3857				1.000	–	1.000	–	1.000	–	1.000	–	1.000	
US$3857–5381				0.856	0.223	0.859	0.283	0.881	0.283	0.883	0.283	0.889	0.284
US$5381–7175				1.031	0.333	1.101	0.343	1.117	0.344	1.127	0.344	1.133	0.346
US$7175–8969				1.062	0.459	1.072	0.449	1.096	0.449	1.119	0.450	1.134	0.453
US$8969–10 762				0.823	0.488	0.833	0.528	0.862	0.528	0.893	0.529	0.893	0.534
≥US$10 762				1.017	0.430	1.023	0.433	1.064	0.433	1.122	0.437	1.123	0.443
40–60													
≤US$3857						1.000	–	1.000	–	1.000	–	1.000	–
US$3857–5381						1.714	0.284	1.816	0.288	1.745	0.289	1.751	0.290
US$5381–7175						2.355	0.340	2.398	0.344	2.306	0.345	2.318	0.347
US$7175–8969						2.819	0.434	2.901	0.438	2.790	0.439	2.819	0.442
US$8969–10 762						2.158	0.509	2.261	0.513	2.110	0.514	2.112	0.519
≥US$10 762						2.653	0.419	2.817	0.423	2.670	0.427	2.654	0.434
>60													
≤US$3857						1.000	–	1.000	–	1.000	–	1.000	
US$3857–5381						1.467	0.305	1.618	0.314	1.505	0.316	1.524	0.319
US$5381–7175						2.577	0.357	2.557	0.366	2.403	0.367	2.438	0.371
US$7175–8969						3.348	0.449	3.412	0.458	3.210	0.460	3.226	0.464
US$8969–10 762						3.056	0.520	3.173	0.530	2.894	0.532	2.890	0.540
≥US$10 762						3.569	0.433	3.822	0.443	3.522	0.448	3.457	0.456
NOWOC (per week)													

Continued

Table 2 Continued

	Empty	Model 1		Model 2		Model 3		Model 4		Model 5		Full model	
	ß	ß	SE	ß	SE	ß	SE	ß	SE	ß	SE	ß	SE
≤2													
≤US$3857								1.000	–	1.000	–	1.000	
US$3587–5381								–0.353	0.161	–0.255	0.157	–0.247	0.165
US$5381–7175								–0.210	0.170	–0.069	0.166	–0.066	0.176
US$7175–8969								–0.326	0.192	–0.132	0.196	–0.127	0.198
US$8969–10 762								–0.394	0.229	–0.116	0.244	–0.121	0.236
≥US$10 762								–0.655	0.200	–0.329	0.221	–0.355	0.208
>2													
≤US$3857								1.000	–	1.000	–	1.000	–
US$3587–5381								0.222	0.222	–0.129	0.223	–0.118	0.227
US$5381–7175								0.218	0.218	0.664	0.225	0.671	0.224
US$7175–8969								0.249	0.249	0.511	0.250	0.512	0.257
US$8969–10 762								0.295	0.295	0.473	0.289	0.472	0.307
≥US$10 762								0.268	0.268	0.212	0.247	0.195	0.280
Time in practice (years)													
10–30													
≤US$3857								1.000	–	1.000	–	1.000	–
US$3587–5381								0.978	0.167	0.913	0.171	0.915	0.173
US$5381–7175								1.617	0.178	1.509	0.182	1.534	0.184
US$7175–8969								2.010	0.209	1.853	0.213	1.901	0.216
US$8969–10 762								2.255	0.248	2.012	0.252	2.008	0.256
≥US$10 762								2.564	0.228	2.276	0.232	2.234	0.236
>30													
≤US$3857								1.000	–	1.000	–	1.000	–
US$3587–5381								0.488	0.187	0.399	0.188	0.403	0.192
US$5381–7175								1.192	0.201	1.051	0.201	1.054	0.205
US$7175–8969								1.831	0.231	1.625	0.232	1.649	0.237
US$8969–10 762								1.519	0.292	1.194	0.293	1.202	0.301
≥US$10 762								2.182	0.251	1.799	0.253	1.828	0.260
Physician office work													
Own PhO													
≤US$3857										1.000	–	1.000	–

Continued

Table 2 Continued

	Empty	Model 1		Model 2		Model 3		Model 4		Model 5		Full model	
	ß	ß	SE	ß	SE	ß	SE	ß	SE	ß	SE	ß	SE
US$3587–5381										0.432	0.199	0.425	0.165
US$5381–7175										0.636	0.213	0.664	0.172
US$7175–8969										0.881	0.228	0.864	0.196
US$8969–10 762										1.297	0.278	1.280	0.238
≥US$10 762										1.550	0.240	1.469	0.212
Work PhO													
≤US$3857										1.000	–	1.000	–
US$3587–5381										0.232	0.161	0.225	0.176
US$5381–7175										0.282	0.171	0.302	0.187
US$7175–8969										0.374	0.193	0.358	0.219
US$8969–10 762										0.448	0.230	0.434	0.279
≥US$10 762										0.606	0.202	0.546	0.247
Specialty types													
IM-based													
≤US$3857												1.000	–
US$3587–5381												0.027	0.158
US$5381–7175												−0.032	0.167
US$7175–8969												−0.299	0.197
US$8969–10 762												0.029	0.246
≥US$10 762												0.025	0.224
Surgery-based													
≤US$3857												1.000	–
US$3587–5381												−0.225	0.224
US$5381–7175												−0.282	0.227
US$7175–8969												−0.326	0.253
US$8969–10 762												0.073	0.292
≥US$10 762												0.625	0.251
Surgery-based and IM-based													
≤US$3857												1.000	–
US$3587–5381												0.118	0.201
US$5381–7175												−0.185	0.216
US$7175–8969												0.072	0.232

Continued

Table 2 Continued

	Empty	Model 1		Model 2		Model 3		Model 4		Model 5		Full model	
	ß	ß	SE	ß	SE	ß	SE	ß	SE	ß	SE	ß	SE
US$8969–10 762												0.130	0.283
≥US$10 762												0.546	0.246
Residual deviance	8.00649	7.77237		7.57641		7.30948		7.27933		7.20437		7.16805	
ANOVA p value		<0.001		<0.001		<0.001		<0.001		<0.001		0.001	

ANOVA, analysis of variance; IM, internal medicine; NOWOC, number of weekly on-call shifts; PhO, physician office.

Most studies tackling the underlying causes surrounding wage differences, even after introducing adjusting factors in their analyses, could not determine the factors that would in fact contribute for such inequalities. In this study, there was a significantly higher proportion of male physicians working in hospitals and private services than women, which could contribute to the wage gap found in our analysis. However, a previous study from our group using the same data set[34] has found a higher proportion of male doctors working as dual practitioners or exclusively in private services, with a specialist profile and many years of medical training. Men also tend to occupy leading positions more frequently, as shown elsewhere.[59] Due to the collinearity effect between the variables 'time in practice' and 'specialty' with the variable and 'place of work', we chose to work with the former, which added greater explicability to the phenomena of gender pay gap. If the 'place of work' variable cannot fully explain gender pay gap, 'time in practice' and 'specialty' cannot either, as they describe the phenomena in the same way.

In Brazil, factors such as entrepreneurialism of men towards achieving higher salaries, prestige and professional status might be associated with the wage disparity reported here. Yet, similarly to those findings reported by Apaydin *et al*,[10] which have found that 30% of payment differences found in selected US states could not be explained by any of the adjusted variables included in the study, the specific drivers behind the income differences between men and women in Brazil remain undetermined and might rely merely on gender discrimination. Our results show that when the variable 'time in practice' was categorically analysed, the wage differences were observed in all categories, meaning that the wage disparity is not produced throughout the medical career. Therefore, we believe that gender might explain the wage disparity found. Nevertheless, future studies should incorporate variables related to sociological and cultural issues in their analyses, or the behaviour and practices of institutions and organisations.

Overall, the situation of women in the universe of medical work in Brazil is paradoxical. The number of women in the profession has increased significantly, but inequalities in relation to men persist, emphasising the remuneration gap. Our results highlight the fact that salary discrepancies between men and women in medicine should no longer be treated with neutrality or simply explained by isolated phenomena such as workload or type of specialty.

Subliminar or explicit gender discrimination is still reported and its consequences go beyond salary inequalities. For example, discrimination and harassment committed by men against women in the workplace affect performance and lead to absenteeism, demotivation, and even depression and anxiety.[53 56] Both the International Labour Organization and WHO advocate for equal payments between men and women, requiring the elimination of all forms of discrimination in jobs and occupations[60] so that gender equality prevails.[61] According to the 2018 Global Gender Gap Report,[62] there is still a 32.0% average gender gap found worldwide. The positive average trend registered since the last report is supported by improvements in the majority of countries covered both this year and last year. However, reduction of inequality will not be solved in legal and procedural terms, or only through wage policies; it will also depend on the social processes by which acceptable commitments are negotiated in relation to the realisation of gender equality.

This study relies on a probabilistic representation of Brazilian physicians and provides a robust, comprehensive multinomial model methodology that gives a differential advantage to support the gender wage inequality discussion. The main limitation is its cross-sectional design, which makes it impossible to establish causality or to argue about the temporal effect of physicians' income difference. Salary is a complex and multidimensional variable that groups together individual and collective elements, fixed or flexible, and different sources can present different results. Furthermore, the medical profession is widely diversified in Brazil, reflecting the very nature of the country's highly fragmented health system, where most physicians hold multiple job positions in public and private services, implicating different configurations of contract modalities and job affiliations.

The study was based on self-reported information on income, and even though the choice of collecting income data through wage categories might have helped to increase the adhesion response for this particular variable, the refusal rate (3.8% of respondents did not want to answer about income) and the very nature of categorising continuous quantitative variables might represent the underestimation of income values.

CONCLUSION

A significant gender wage difference exists in Brazil, and female physicians are more frequently positioned in lower wage categories. Our data show that even after adjusting for working factors as weekly workload, NOWOC shifts, physician office work, time in practice and specialty type, the gender influence in wage remains inexplicably high.

Future studies should always include the characteristics of medical work as adjustment variables. These studies may also include other sociodemographic variables or relate to trajectories and social organisation of private life. These should be added to qualitative studies that seek to understand gender inequalities from the relationships between men and women in different spaces and aspects of society.

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